

## **Final Technical Report**

**Award Number:** DE-FC36-02GO12088

**Project Title:** Industrial Assessment Center (IAC) at Lehigh University

**Project Period:** 9/1/2002 to 11/30/2006

**Recipient Organization:** Lehigh University  
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**Partners:** n/a

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## **Executive Summary**

*Provide a brief executive summary which includes a discussion of 1) a summary of the center's accomplishments; 2) how the effort contributed to energy savings in the U.S.; and 3) how the project is otherwise of benefit to the public. Note: This section can be cut and pasted into the online DOE Form 241.3 in the Description/Abstract section.*

(1) During the period September, 2001, through August, 2006, the Lehigh University Industrial Assessment Center provided assessments for 147 companies in the Eastern Pennsylvania and New Jersey. In reports sent to the companies, a total of 1,079 assessment recommendations were suggested, with an annual cost savings of \$22,980,654, to save energy, reduce waste, and improve productivity. The energy saved if all ARs were implemented would be 1,843,202 MMBtu.

Also during this period, a one-day Energy Savings Workshop, lead by Professors Sudhakar Neti and Alparslan Oztekin, was held at Lehigh University on July 7, 2006. There were 25 attendees, including 3 from the Pennsylvania Department of Environmental Protection, 3 graduate students from Lehigh, and one attendee from the Sustainable Energy Fund.

During the period, the Lehigh University Industrial Assessment Center worked in conjunction with the Pennsylvania Department of Energy, the Penn State Metal Casting Program, the University of Delaware, the Maryland Energy Administration, and the Lehigh Energy Research Center.

Through this period, the following people were employed as necessary by the Lehigh University Industrial Assessment Center:

Lead Assessors:

Neti, Sudhakar (Director)  
Oztekin, Alparslan (Assistant Director)  
Bilirgen, Harun  
Conn, Richard  
Panchagnula, Mahesh  
Romero, Carlos

Twelve Graduate Students and/or visiting scholars were employed as necessary

Bonilla, Jose Barrios  
Colistra, Josh  
Dairo, Adesoji  
Kettering, Chad  
Kim, Daniel  
Kocabay, Sevan  
Park, Won Cheol  
Shages, Christopher  
Ukaew, Ananchai  
Vempati, Bhadraiah

Yalcin, Huseyin  
Yang, Yijun  
Yilmaz, Ali

Fourteen Undergraduate Students were employed as necessary  
Bruestle, Matthew  
Fricker, Zachary  
Gerenski, Edwin  
Kwok, Ka Wai  
Lazar, Jill  
Maurizio, Randall  
Morarka, Alok  
Muniandy, Satiesh  
Rose, Latoya Stacy  
Skuba, Randall  
Spalding, Taurin  
Tong, Kwok Fai  
Tripp, Randy Scott  
Vitella, Joseph

1 Administrative Assistant was employed as necessary (33% effort)  
Casciano, JoAnn

Most of the above graduate students got certificates from the IAC, and are part of the IAC student registry at ORNL.

(2) Energy Savings: the Lehigh IAC undertook 147 assessments during the period September, 2001, through August, 2006. These companies were asked to complete Implementation Surveys approximately six months following receipt of recommendations sent to them. Most companies completed the survey. From these surveys, we were able to ascertain that 347 recommendations were implemented, resulting in an annual cost savings of \$5,641,733. The energy saved from implementation of these recommendations is 439,582 MMBtu. Forty-two plants either did not respond to the request for completion of the implementation survey (even though they were contacted numerous times) and some companies did not implement any ARs due to such reasons such as budget constraints and closing of the company. We continue to request implementation surveys for plants that have not responded and as soon as they respond, we have updated the database with the additional information received.

### **Task Summary**

*Summarize the IAC's activities by task for the entire period of funding.*

**Task 1: Conduct Industrial Assessments, to include a variety of plant types and sizes and well as coverage of the geographic area defined in the Annual Workplan Industrial Assessments:** *Provide a summary of the assessments performed over the life of the award.*

*Include overall number of assessments, types of businesses assessed, number of ARs, and any other related info.*

147 assessments

Types of businesses: Small to medium sized manufacturers in NJ and Eastern PA.

Number of ARs recommended: 1,079

Number of ARs implemented: 347

Every plant received a detailed report within sixty days describing the recommendations and an Executive Summary sent to the plant manager and/or company CEO.

**Task 2: Promote and increase the adoption of assessment recommendations and employ innovative methods to assist in accomplishing these goals.** *Provide a summary of the efforts used to promote the adoption of ARs, including any available overall adoption statistics.*

An Implementation Survey was sent to the client approximately six months after the client received the assessment report. If the client did not return the completed survey, the client was contacted approximately once a month via phone, email and letter until the information was received. In many instances, a partial survey was submitted (e.g., ARs were under consideration for future implementation), and the company was again contacted approximately six months later for updates. In most cases, repeated inquiries were necessary to obtain the information.

**Task 3: Promote the IAC Program and enhance recruitment efforts for new clients and expanded geographic coverage.** *Describe efforts to promote the IAC program and expand the reach of the center.*

During the course of the grant, thousands of informational letters were sent to companies in eastern Pennsylvania and New Jersey, along with a brochure describing the Lehigh University Industrial Assessment Center. The contact information was obtained from the Harris Directory. Many companies were called approximately one week following each mailing, in order to determine if there was any interest in an assessment and to answer questions. Leads were also received from the Pennsylvania Department of Energy, the Penn State Metal Casting Program, the University of Delaware, the Maryland Energy Administration, and the Lehigh Energy Research Center. The Lehigh IAC has a website describing its activities, encouraging visitors to the website to contact the Lehigh IAC for an energy assessment.

**Task 4: Provide educational opportunities, training, and other related activities for IAC students.** *Summarize education, training and any other activities for the students. Include overall number of students that participated during the course of the award.*

Twelve graduate students and/or visiting scholars

Fourteen undergraduate students

Graduate students received training from the lead assessors and they, in turn, trained the undergraduate students. Students also learned various assessment and safety procedures from IAC manuals prepared expressly for that purpose. All students were given the opportunity to participate in the assessments, after which they were involved with the preparation of

Assessment recommendations (ARs) that included detailed engineering calculations/analyses and writing of the report.

Safety Training was a required of all participants including the lead assessors and the participants studied and acknowledged (with a signature) studying the Safety Manual.

I only have copies of the following three IAC Record of Accomplishments. Did other students apply for them? Students may have gone directly to you for signature and they may have been mailed directly to the student.

The below listed graduate and under graduate students completed their student certification and registered with IAC database at ORNL

Josh Colistra, Chad Kettering, Sevan Kocabay, Won Cheol Park, Christopher Shages, Bhadriah Vempati, Huseyin Yalcin, Yijun Yang.

Matthew Bruestle, Zachary Fricker, Edwin Gerenski, Ka Wai Kwok, Alok Morarka, Taurin Spalding, Randy Scott Tripp

IAC staff attended IAC meetings and/or various training sessions as listed below:

Harun Bilirgin – IAC PSAT Training Course, Dallas, Texas, 6/2002

IAC Student Meeting in Washington, February, 2003, H. Cagatay Yalcin and S. Kocabay

S. Neti travel to Syracuse, NY, for DOE course in Best Practices PSAT, March 30, 2003.

Industrial Assessment Center Director's Meeting, attended by S. Neti (every year) and A. Oztekin (most years).

S. Neti, NJ Industries of the Future Seminar, Piscataway, NJ, March 24, 2005.

S. Neti, Industrial Assessment Center Meeting, Washington, D.C. 4/24-4/26/06

**Task 5: Coordinate and integrate Center activities with other Center and IAC Program activities, DOE's Industrial Technologies programs and other EERE programs.** *Summarize the integration activities with other centers, the ITP program, state programs, etc.*

The Lehigh IAC invited the following on selected assessments and also worked with these organizations to spread the message of energy efficiency (E2):

The Pennsylvania Department of Environmental Protection (PADEP)

The Pennsylvania Metal Castors Association (PFA)

The University of Delaware

The Maryland Energy Administration

Manufacturers Resource Center (local MEP)

Small Business Development Center (at Lehigh University)

**Task 6: Other tasks or special projects, as needed, and as determined by DOE to be advantageous to the program and in furtherance of IAC Program goals.** *Briefly describe any other special projects or tasks performed for DOE under the award.*

A one-day Energy Savings Workshop, lead by Professors Sudhakar Neti and Alparslan Oztekin, was held at Lehigh University on July 7, 2006. There were 25 attendees, including 3 from the Pennsylvania Department of Environmental Protection, 3 graduate students from Lehigh, and one attendee from the Sustainable Energy Fund.

Information on U.S. DOE Best Practices was very widely distributed to hundreds of plants in our area.

Information regarding the *Save Energy Now* program was distributed to all previous clients in March of 2006. Companies on a list given to us by Rutgers were contacted. Five assessments were conducted as a result of these contacts.